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(54) METHODE ET APPAREIL DE CONFIGURATION D'UN LOGICIEL TELEPHONIQUE A DISTANCE

(54) REMOTE TELEPHONE SOFTWARE CONFIGURATION APPARATUS AND METHOD

(57)

A file download method and apparatus for downloading files from a network into memory. The apparatus includes a processor operable to communicate on the network. The processor runs a browser for downloading from a first resource identified by a first network resource locator, an applet including a second network resource locator, an applet viewer for running the applet, a public interface for communicating with the applet to receive the second network resource locator from the applet, a security manager for preventing running applets from accessing the memory and a handler having access to the memory, the handler being in communication with the public interface, for communicating with a second network resource identified by the second network resource locator to receive and store in the memory, a file from the second network resource.



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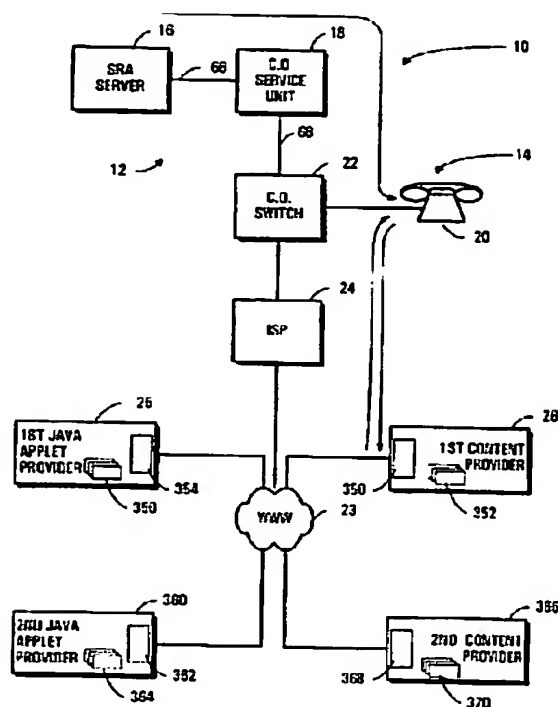
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(54) **METHODE ET APPAREIL DE CONFIGURATION D'UN
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(54) **REMOTE TELEPHONE SOFTWARE CONFIGURATION
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(57) A file download method and apparatus for downloading files from a network into memory. The apparatus includes a processor operable to communicate on the network. The processor runs a browser for downloading from a first



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resource identified by a first network resource locator, an applet including a second network resource locator, an applet viewer for running the applet, a public interface for communicating with the applet to receive the second network resource locator from the applet, a security manager for preventing running applets from accessing the memory and a handler having access to the memory, the handler being in communication with the public interface, for communicating with a second network resource identified by the second network resource locator to receive and store in the memory, a file from the second network resource.



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**REMOTE TELEPHONE SOFTWARE CONFIGURATION
APPARATUS AND METHOD**

ABSTRACT

A file download method and apparatus for downloading files from a network into memory. The apparatus includes a processor operable to communicate on the network. The processor runs a browser for downloading from a first resource identified by a first network resource locator, an applet including a second network resource locator, an applet viewer for running the applet, a public interface for communicating with the applet to receive the second network resource locator from the applet, a security manager for preventing running applets from accessing the memory and a handler having access to the memory, the handler being in communication with the public interface, for communicating with a second network resource identified by the second network resource locator to receive and store in the memory, a file from the second network resource.

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**REMOTE TELEPHONE SOFTWARE CONFIGURATION
APPARATUS AND METHOD**

FIELD OF THE INVENTION

5 This invention relates to remote configuration of a telephone and more particularly to downloading files from a network for execution on a telephone.

BACKGROUND OF THE INVENTION

10 The features and services available in subscriber telephone sets and in available telephone services continue to grow in richness and flexibility. Many microprocessor-based telephones are capable of supporting many different mixtures of features and capabilities, by changing the
15 configuration of processor-readable parameters.

At the same time, the costs and delays associated with visits to the subscriber premises by service provider personnel are becoming less acceptable to the subscriber.

20 It would be desirable, therefore, for telephone service providers to be able to change the configuration of a subscriber telephone set without visiting the subscriber premises.

25 Some manufacturers' telephones have been modified to support remote re-configuration by using a variant of the "Caller ID" signal, whereby the telephone service provider can, presumably in response to a request by the subscriber, add, modify or delete services or other parameters defined
30 within the telephone's processor subsystem. In simple situations, this re-configuration can be accomplished by this method in a few seconds. The quantity of data associated with a more complex telephone, or especially one
35 capable of displaying promotional or informative images, is not efficiently transferred using this method, because of inherent limitations in the data transmission speeds

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available. A faster method of transferring data to a telephone is required to support these newer, display capable telephones. Operating companies need a way to force a telephone to get information on a periodic basis.

5 Existing suppressed Ring Access (SRA) techniques rely on FSK (frequency shift keying) data which is very slow and is not reliable.

Generally, software in telephones is difficult to field upgrade because it must be downloaded and verified before the old software is deleted. Traditionally, software was upgraded in a single unit requiring that the full software application be duplicated before it can be verified and accepted. This is very costly as it requires a relatively

10 large memory area to hold both the old software and the new software.

The problem is compounded as software, data and service downloads require a large number of files to be downloaded successfully to the telephone. If one file is missed or downloaded improperly then the entire download could be compromised. Individual file downloads are possible but the files must be managed, which greatly complicates the

20 system.

25 What would be desirable is a way of conveniently field upgrading telephone software on line, without requiring entire software replacement. The present invention addresses this need.

30

SUMMARY OF THE INVENTION

In accordance with one aspect of the invention, there is provided a file download method and apparatus for downloading files from a network into memory. The

35 apparatus includes a processor operable to communicate on the network. The processor runs a browser for downloading from a first resource identified by a first network

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resource locator, an applet including a second network resource locator, an applet viewer for running the applet, a public interface for communicating with the applet to receive the second network resource locator from the
5 applet, a security manager for preventing running applets from accessing the memory and a handler having access to the memory, the handler being in communication with the public interface, for communicating with a second network resource identified by the second network resource locator
10 to receive and store in the memory, a file from the second network resource.

Preferably, the handler is operable to decompress the file from the second network resource to produce a plurality of
15 decompressed files.

Preferably, the handler is operable to verify the file has been received in accordance with pre-defined criteria.

20 Preferably, the handler is operable to extract a password from the file and compare the password against a pre-defined password and to store the file in the memory when the password matches the pre-defined password.

25 Preferably, the handler is operable to extract a filename from the file from the second resource and load the file into an area of memory associated with the filename.

Preferably, the apparatus includes an FSK receiver for
30 receiving an FSK message having a first network resource locator identifying the first resource and preferably, the browser is operable to receive the first network resource locator from the FSK receiver.

35 Preferably, the apparatus includes a first telephone line interface for receiving the FSK message from a first

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telephone line and for providing the FSK message to the FSK receiver.

5 Preferably, the apparatus includes an event parser for extracting the first uniform resource locator from the FSK message for presentation to the browser.

10 Preferably, the apparatus includes a second telephone line interface, the processor using the second telephone line interface for communicating on the network.

15 In accordance with another aspect of the invention, there is provided a computer readable medium on which is stored a plurality of computer readable codes representing instructions for directing a processor to download files from a network into memory in communication with the processor, the processor being operable to communicate on the network, the instructions directing the processor to:

- 20 a) implement a browser operable to download to the processor from a first resource identified by a first network resource locator, an applet including a second network resource locator;
- 25 b) run the applet on the processor;
- c) receive the second network resource locator from the applet;
- 30 d) prevent applets running on the processor from accessing the memory; and
- e) communicate with a second network resource identified by the second network resource locator to receive and store in the memory, a file from
35 the second network resource.

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Preferably, the computer readable medium includes a plurality of computer readable codes for directing the processor to decompress the file from the second network resource to produce a plurality of decompressed files.

5

Preferably, the computer readable medium includes a plurality of computer readable codes for directing the processor to verify the file has been received in accordance with pre-defined criteria.

10

Preferably, the computer readable medium includes a plurality of computer readable codes for directing the processor to extract a password from the file and compare the password against a pre-defined password and to store the file in the memory when the password matches the pre-defined password.

15

Preferably, the computer readable medium includes a plurality of computer readable codes for directing the processor to extract a filename from the file from the second resource and load the file into an area of memory associated with the filename.

20

Preferably, the computer readable medium includes a plurality of computer readable codes for directing the processor to receive an FSK message having a first network resource locator identifying the first resource and receive the first network resource locator from the FSK receiver.

25

Preferably, the computer readable medium includes a plurality of computer readable codes for directing the processor to receive the FSK message from a first telephone line and provide the FSK message to the FSK receiver.

30

Preferably, the computer readable medium includes a plurality of computer readable codes for directing the

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processor to extract the first uniform resource locator from the FSK message for presentation to the browser.

5 Preferably, the computer readable medium includes a plurality of computer readable codes for directing the processor to use a second telephone line interface for communicating on the network.

10 In accordance with another aspect of the invention, there is provided a method for remotely configuring a telephone having a processor operable to communicate on a network and memory accessible by the processor for storing groups of processor readable codes for directing the processor to effect telephone functionality. The method includes the steps of:

- 15 a) downloading to the processor from a first network resource on the network, an applet including a second network resource locator;
- 20 b) running the applet on the processor;
- c) to receiving the second network resource locator from the applet;
- 25 d) preventing applets running on the processor from accessing the memory; and
- e) establishing communications between the processor and a second network resource identified by the second network resource locator to receive and storing in at least one of the groups, a file from the second network resource.
- 30

35 In accordance with another aspect of the invention, there is provided a remotely configurable telephone having a processor operable to communicate on a network and memory

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accessible by the processor for storing groups of processor readable codes for directing the processor to effect telephone functionality, the processor being programmed to run:

- 5 a) a browser for downloading to the processor from a first network resource on the network, an applet including a second network resource locator;
- 10 b) an applet viewer for running the applet on the processor;
- 15 c) a public interface for communicating with the applet to receive the second network resource locator from the applet;
- 20 d) a security manager for preventing applets running on the processor from accessing the memory; and
- 25 e) a handler providing the processor access to the memory, the handler being in communication with the public interface, for communicating with a second network resource identified by the second network resource locator to receive and store in at least one of the groups, a file from the second network resource.

30 In accordance with another aspect of the invention, there is provided a method of remotely configuring a telephone having a processor operable to communicate on a network and memory accessible by the processor for storing groups of processor readable codes for directing the processor to effect telephone functionality, the method including the steps of:

35

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- a) downloading to the processor from a first network resource on the network, an applet including a second network resource locator;
- 5 b) running the applet on the processor;
- c) receiving the second network resource locator from the applet;
- 10 d) preventing applets running on the processor from accessing the memory; and
- 15 e) establishing communications between the processor and a second network resource identified by the second network resource locator to receive and store in at least one of the groups, a file from the second network resource.

20 In accordance with another aspect of the invention, there is provided a computer readable medium on which is stored a plurality of computer readable codes representing instructions for directing a processor to remotely configure a telephone having a processor operable to communicate on a network and memory accessible by the processor for storing groups of processor readable codes for directing the processor to effect telephone functionality, the instructions directing the processor to:

- 30 a) download from a first network resource on the network, an applet including a second network resource locator;
- b) run the applet;
- 35 c) communicate with the applet to receive the second network resource locator from the applet;

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- d) prevent running applets from accessing the memory; and
 - e) communicate with the public interface, to
5 communicate with a second network resource identified by the second network resource locator to receive and store in at least one of the groups, a file from the second network resource.
- 10 Effectively an aspect of the invention involves the use of a short FSK blast which instructs the telephone to navigate to the web using a high speed modem. The modem connection is a reliable high speed connection which can be used to download large files of telephone functionality software or
15 display-based advertising.

The use of Java software helps facilitate upgrading of telephone software in small components (packages) which means that only the downloaded component needs to be
20 duplicated in memory. This is much more cost effective and much easier to implement compared to existing systems.

The large file to be downloaded is preferably a compressed file bundle which includes all the necessary replacement or
25 new files to be sent to the telephone in one verifiable download. An applet is started on the telephone which makes a call to a main application running on the phone to download the bundle and install it in a location in the file system. The telephone then starts the download of the
30 file bundle and dynamically decompresses the bundle into individual files. Once the full bundle has been downloaded it is verified and the installation is completed. The bundle is verified, through a checksum algorithm, that it was properly received and in this manner, all files are
35 verified as having been received properly.

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This invention provides a subscriber telephone set with the ability to efficiently receive and activate configuration and other files defined by a service provider, without intervention by the subscriber, and without the requirement
5 for attendance at the subscriber premises by service provider personnel.

BRIEF DESCRIPTION OF THE DRAWINGS

- 10 In drawings which illustrate embodiments of the invention,
- Figure 1 is a schematic diagram of an apparatus for downloading files from a network into memory according to a first embodiment of the invention;
15
- Figure 2 is a block diagram of a suppressed ring access (SRA) server and a central office service unit according to the first embodiment of the invention;
20
- Figure 3 is a schematic representation of an SRA control message and an SRC message transmitted by the SRA server and the central office service unit respectively;
25
- Figure 4 is a schematic representation of a central office and a telephone according to the first embodiment of the invention;
- 30 Figure 5 is a block diagram of a central office line interface in the telephone of Figure 4;
- Figure 6 is a tree diagram of a directory structure of file directories within the telephone;
35
- Figure 7 is a schematic representation of storage areas in the RAM shown in Figure 4;

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Figure 8 is a schematic representation of a program architecture in a processor in the telephone of Figure 4;

5 Figure 9 is a flowchart of an event parser thread run by a system processor of the telephone of Figure 4;

Figure 10 is a flowchart of a main event handler thread run by the system processor;

10

Figure 11 is a flowchart of an event dispatcher run by the system processor;

15 Figure 12 is a flowchart of the browser thread run by the system processor;

Figure 13 is a flowchart of a network driver run by the system processor;

20 Figure 14 is a flowchart of an applet thread run by the system processor;

Figure 15 is a flowchart of a public interface method by the system processor; and

25

Figure 16 is a flowchart of a handler thread run by the system processor.

DETAILED DESCRIPTION

30

Figure 1

Referring to Figure 1, a system for downloading files from a network into memory in communication with a processor operable to communicate on the network is shown generally at 10. In this embodiment a first network node is shown generally at 12 while a second network node is shown generally at 14.

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The first network node includes a modified ring access server which, in this embodiment is a suppressed ring access (SRA) server 16 and a central office service unit 18 and the second network node includes a telephone 20. The suppressed ring access server 16 is in communication with the central office service unit 18 and the central office service unit is in communication with the telephone through a central office switch 22 in the public switched telephone network.

10 In addition to providing conventional telephone features, the telephone 20 receives FSK messages including a network resource indicator, through suppressed ring access or single ring access initiated by the SRA server 16 and
15 central office service unit 18. The telephone 20 also has transceiver hardware and software for establishing communications with an internet service provider 24, through the central office switch 22 to establish communications with first or second Java applet providers
20 25 and 360 which act as network resources identified by network resource indicators included in the FSK message provided to the telephone by the central office service unit 18. The SRA server thus directs the telephone 20 to a network resource from which it can download Hypertext
25 Markup Language (HTML) pages. Such HTML pages may include applets which can be run at the telephone 20 to direct the telephone to communicate with first or second content providers 26 and 366 which can provide files to re-configure the telephone to change the functionality thereof
30 to display content such as advertising or to provide enhanced telephone features.

Figure 2
SRA server

35 Referring to Figure 2, the SRA server 16 includes a database shown generally at 28, a database manager 30, a communications interface 32 and an administrator terminal

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34. The database 28 is used to store a plurality of records including telephone number records 36, customer premises equipment identification (CPE ID) records 38 and feature records 40.

5

The telephone number records 36 have telephone number fields 42, and subscriber information fields 44 while customer premises equipment records 38 have telephone number fields 46 and CPE ID fields 48. The contents of the telephone number fields 42 and 46 link telephone number records and CPE ID records together when the telephone number fields 42 and 46 have the same contents.

The feature records 40 have respective URL fields 50 for storing a uniform resource locator identifying a first network resource on the world-wide web at which an HTML page including a download applet is available. The download applet is runnable by the telephone 20 to provide the telephone with the functionality required to download a feature applet from the same network resource or a different or second network resource.

The database manager 30 receives commands from the administrator terminal 34 to create and amend telephone number records 36 and CPE ID records 38 in the database 28. A separate telephone number record is associated with each telephone and therefore in this embodiment, telephone number record 36 is associated with telephone 20 shown in Figure 1. A CPE ID record is also associated with telephone 20, and has a CPE ID field 48 identifying an address of an equipment block within the telephone. This facilitates a plurality of different equipment to be connected to the same telephone line from the central office switch (22), while allowing each different equipment to be individually addressable.

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In one scenario, the SRA server 16 is maintained by a telephone company providing telephone services to subscribers such as the user of telephone 20. The database records are created such that separate telephone number records are associated with respective corresponding subscriber lines and separate equipment ID records 38 are associated with respective corresponding equipment connected to a given line, at the subscriber's premises.

10 In the event that a user requests a change in telephone features, an administrator enters the change into the administrator terminal 34 which directs the database manager 30 to search the telephone number records and CPE ID records to locate the user's telephone number and CPE ID

15 for the telephone which is to be changed to include the new telephone features. At the same time, the database manager 30 searches the feature records 40 to locate a record containing a uniform resource locator (URL) defining an address of a resource on the internet at which an HTML page

20 including an applet which provides a URL identifying a resource from which the telephone downloads a file using a file transfer protocol (FTP), the file being executable by the telephone to provide extended functionality thereto.

25 Figure 3

In response to the database search, the database manager produces an SRA control message as shown at 31 in Figure 3, including a message identifier 33 identifying the type of loop carrier in the connecting path to the subscriber

30 location, a telephone number of a subscriber line 35, and a CPE ID 37 identifying equipment on the subscriber line to which the SRA control message is addressed, and a URL 39 copied from the uniform resource locator field 50 of the feature record 40. Referring back to Figure 2, this SRA control message is provided to the communication interface

35 32 which transmits it to the central office service unit 18.

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Central Office Service Unit

Still referring to Figure 2, in this embodiment, the Central Office service unit 18 includes a telemetry network access computer 60, an SRA communications interface 62 and
5 a central office interface 64 including an FSK transmitter 65. The SRA communications interface 62 is connected to the communications interface 32 of the SRA server 16 by a public packet switched network link 66 and provides messages received from the SRA server 16 to the telemetry
10 network access computer 60. The FSK transmitter 65 in the central office interface 64 is controlled by the telemetry network access computer 60 and is connected to the central office (not shown in Figure 2) by at least one trunk 68 having a suppressed ring access class of service.

15 In general, the telemetry network access computer 60 receives SRA messages from the SRA server 16 and produces on the trunk 68 suppressed ringing connection (SRC) messages in an FSK format, as shown generally at 70 in
20 Figure 3. The suppressed ringing connection messages are thus FSK messages.

Referring back to Figure 3, SRC messages have a format which includes a message type field 72, a total length
25 field 74, a CPE ID field 76, a parameter type field 78, a parameter length field 80, and a parameter data field 82. The message type field identifies the message as a suppressed ring connection message. Predefined codes are used to identify predefined message types. The total
30 length field 74 is used to hold a value representing the total length of the SRC message. The CPE ID field 76 is loaded with the contents of the CPE ID field 37 of the SRA control message from the SRA server. The parameter type field 78 is used to identify the type of data stored in the
35 parameter data field 82 and, in this embodiment, the parameter type field stores a predefined code representing that the contents of the parameter data field 82 relate to

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URL data. The parameter length field 80 is used to identify the length of the parameter data field 82. The parameter data field 82 is, in this embodiment, used to store the uniform resource locator identifying the first network resource or first provider 25, from the URL field 39 of the SRA control message from the SRA server. The FSK message thus has a first network resource locator identifying the first network resource.

10 Figure 4
Central office

Referring to Figure 4, the central office switch 22 includes a program driven digital switch including a switching network 45, a program controlled processor 47 a trunk unit 57 and a plurality of subscriber interfaces, only two of which are shown at 59 and 61.

The trunk unit 57 senses activation by the central office service unit and signals the program controlled processor 47, to indicate such activation. The program controlled processor then controls the switching network 45 to provide voice path connections for communicating suppressed ring access messages from the central office service unit 18 to subscriber locations such as the telephone 20 served by the central office switch 22. Communication between each subscriber location and the switching network 45 occurs via the subscriber interfaces, each of which includes a line unit 49, a digital loop carrier 51 at the switch location, a transmission path 52, a digital loop carrier 54 at a remote location and a subscriber line 56, 58.

Generally, the trunk 68 has a class of service which identifies to the central office switch 22 that the connections being requested by the central office service unit 18 are to be made with ringing suppressed, ie., with no ringing signal transmitted or with a burst of ringing signal transmitted of sufficient length to activate the

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digital loop carriers 51 and 54 but of insufficient length to be present for any significant time after connection is completed. Accordingly, the central office service unit 18 can establish connections through the central office switch 5 22 to the subscriber locations, and such connections are accompanied by no or little (ie., short) ringing. These connections facilitate the transmission of suppressed ring access messages in an FSK format to the telephone. In other words, the central office service unit places a call 10 through the central office on a trunk line having a special class of service. The central office detects that a call is being made on the special trunk line and activates the digital loop carriers for the line to which the call is being made, to enable communication between the central 15 office service unit and the telephone, without activation (suppressed ringing) or with minimum activation (single ring) of ring tone generation circuitry (not shown) in the central office. Thus, a communication link is established between the central office service unit 18 and the 20 telephone to permit the FSK suppressed ring access message to be transmitted from the central office service unit to the telephone.

Telephone

25 Referring to Figure 4, the telephone is shown generally at 20 and includes a system microprocessor 90, a telephony microcontroller 92, and a central office line interface 94 in communication with both the system microprocessor 90 and the telephony microcontroller 92. The system 30 microprocessor is connected to a keyboard interface 96 and a keyboard 98, for receiving user input for commanding the system microprocessor 90 to effect certain functionality. The system microprocessor is further connected to a display interface 100 which is further connected to a display 102, 35 for displaying output to a user.

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The telephony microcontroller 92 is in communication with the system microprocessor 90 by a plurality of signal lines 104 and is further in communication with a handset interface 105 for controlling signals to and from a conventional handset 106 and a hands-free interface 107 for providing conventional speakerphone functionality to the telephone.

The telephony microcontroller 92 is further in communication with a dial pad 108 of the conventional type, for enabling a user to dial telephone numbers at the telephone.

Figure 5

Referring to Figure 5, the central office line interface is shown in greater detail at 94. The central office line interface has first and second telephone line inputs 110 and 112 which are connected to the first and second telephone lines 56 and 58 respectively. The first line input 110 is connected to a line 1 modem terminal 114, a two to four wire interface terminal 116 and an on-hook extension in use detector 118. The modem terminal 114 is connected to a line selector switch shown generally at 120 having a selector terminal 122 and a line 2 modem terminal 124. The line selector switch 120 is controlled by a line selector control circuit 126 to connect the selector terminal to either the line 2 modem terminal 124 or the line 1 modem terminal 114. The selector terminal 122 is further connected to a modem hook switch 128 which is controlled by a modem 130 in communication with the system microprocessor 90, shown in Figure 4.

Referring back to Figure 5, the modem hook switch 128 is connected to a data access arrangement 132 which isolates the modem from the telephone line and provides a DC path for seizing the line. The data access arrangement 132 is in communication with the modem 130, to provide analog

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signals to and from the modem 130, for communication to the system microprocessor.

5 The central office line interface further includes a line hook switch 134 and a two wire to four wire hybrid circuit 136. The hook switch 134 is controlled by a line hook switch control circuit 138 which opens and closes the hook switch 134 thereby connecting and disconnecting the first telephone line to and from the two to four wire hybrid circuit 136.

10 The two to four wire hybrid circuit 136 has a transmit input 140 and a receive output 142 and an off-hook detect signal output 144. The transmit input 140 is connected to a DTMF generator 146 and a transmit output of an audio circuit 148. The DTMF generator is operable to provide tones to the transmit input 140 to provide DTMF tones on the first telephone line 56.

20 The receive output 142 of the two to four wire hybrid circuit 136 is connected to a receive input of the audio circuit 148, and is further connected to an FSK receiver 150 and a caller alerting signal receiver 152. The two to four wire hybrid circuit thus acts as a receiver or means for receiving the FSK message from a first telephone line and providing the FSK message to the FSK receiver and the FSK receiver acts as a receiver or means for receiving an FSK message having a first network resource locator identifying the first resource.

25 30 The off-hook EIU detect output 144 of the two to four wire hybrid circuit 136 is connected to an off-hook EIU detect circuit 154 which provides a signal indicating whether or not an extension is in use on the first telephone line, at the same time that the hook switch 134 is closed.

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The on-hook extension in use detector 118 monitors the first telephone line 56 to provide a signal indicating whether or not an extension is in use on the first telephone line, when the hook switch 134 is in the open position.

The line selector control circuit 126, the line hook switch circuit 138 and the DTMF generator 146 are operable to receive signals from the telephony microcontroller 92 shown in Figure 4, to control the state of the line selector switch 120, to selectively connect the modem 130 and data access arrangement 132 to the first or second telephone lines 56 or 58 and to control the state of the line hook switch 134 and to provide DTMF signals to the two to four wire interface for transmission on the first telephone line, respectively. The modem 130 and data access arrangement thus act as a second telephone line interface.

The audio circuit 148 is in bi-directional communication with the telephony microcontroller which effectively provides an audio path, with audio signal processing to the handset interface 105 or hands-free interface 107 shown in Figure 4.

The FSK receiver 150, caller alerting signal receiver 152, off-hook EIU detect circuit 154 and on-hook extension in use detector 118 provide FSK, CAS, off-hook EIU and on-hook EIU signals respectively to the telephony microcontroller 92, which communicates these signals to the system microprocessor 90.

Referring back to Figure 4, the system microprocessor 90 is further in communication with FLASH memory 156 and random access memory (RAM) 158.

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Figure 6

Referring to Figure 6, the FLASH memory holds a directory structure as shown generally at 161. The directory structure includes a base directory having a hardware
5 abstraction layer file 163, an operating system file 165, a system subdirectory 167, a data subdirectory 169, a Java subdirectory 171 and a temporary subdirectory 173.

The hardware abstraction layer file 163 includes basic boot
10 commands for booting up the system processor and for directing it to load the operating system file 165 into RAM, where it is run by the processor.

The operating system file 165 contains operating system
15 commands for establishing basic operation of the system microprocessor 90. The operating system commands include a Board Support Package (BSP) and drivers which direct the processor to interact with the central office line interface 94, the telephony microcontroller 92, the
20 keyboard interface 96 and the display interface 100 shown in Figure 4. In this embodiment, the operating system is known as VX Works (tm) provided by Windriver of Alameda, California. The operating system maintains a routing table 155 in the RAM 158 shown in Figure 4 for maintaining
25 details of connections established through the central office line interface 94 on the second subscriber line 58 shown in Figure 4.

The operating system file further include code implementing
30 a Java (tm) virtual machine and a graphics layer known as RTX X-Windows server (tm) by Visicom of San Diego, California. The Java virtual machine includes core Java packages including Java.lang, Java.io, Java.applet, Java.net and Java.awt which in connection with the
35 operating system files create a Java run time environment at the system microprocessor 90.

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Still referring to Figure 6, the system subdirectory 167 includes an applications subdirectory 175 and an extensions subdirectory 177. The applications subdirectory 175 includes a telephone subdirectory 179 containing files for directing the system microprocessor 90 to cooperate with the telephony microcontroller 92 to provide telephony functionality. The applications subdirectory further includes an event parser subdirectory 181 containing event parser files, a main event handler subdirectory 183 containing main event handler files, a browser subdirectory 185 containing browser files, a public interface subdirectory 187 containing public interface method files 189 and a handler subdirectory 191 containing handler files.

The extensions subdirectory 177 includes an email subdirectory 193 containing email files for providing email functionality, a fax interface subdirectory 195 containing fax files for providing fax functionality, a games subdirectory 197 containing game files for providing game functionality, a horoscope subdirectory 199 containing horoscope files for communicating with horoscope content providers, a sports subdirectory 201 containing sports provider files for communicating with sports information providers, a stocks subdirectory 203 containing stock provider communication files for communicating with stock information providers and a marketing subdirectory 205 containing marketing files for providing display advertising on the display 102.

The data subdirectory 169 includes a configuration data subdirectory 207 containing configuration files including a CPE ID file 210 and an event code lookup table file 208. The CPE ID file 210 holds a CPE ID of the telephone, to identify the telephone from other telephones which may be connected to the same telephone line. The event code lookup table file 208 contains an event code lookup table

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having parameter type and URL event code fields 211 and 213 respectively, for associating parameter types with URL event codes.

- 5 The Java subdirectory 171 includes Java class files of the type classes.jar.

The temporary subdirectory 173 is used to store applets, HTML pages and files which may be downloaded over one of
10 the analog subscriber lines 56 and 58 shown in Figure 4.

In general, the FLASH memory 156 stores groups of processor readable codes for directing the processor to effect telephone functionality and thus acts as a computer-
15 readable storage medium for directing the processor to carry out the method described herein.

Referring to Figure 7, the RAM 158 is used to maintain an FSK receive buffer 200, a variable buffer 202, a main event
20 handler buffer 204, an event queue buffer 206 and a routing table 155.

The FSK receive buffer 200 is of sufficient length to receive FSK messages, in general. Such messages may
25 include caller ID information and the like and, more particularly, such messages may include SRC messages sent by the central office service unit 18 shown in Figure 1.

The variable buffer 202 and the main event handler buffer
30 204 hold variable and main event records respectively. The variable records include a parameter type field 215 and a data field 216 and the main event records include a parameter type field 217 and a data field 209. The event queue buffer 206 is a variable length buffer for storing
35 various event queue records, each of which includes an event code field 248 and a data field 250.

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Figure 8

Referring briefly to Figure 4, the system microprocessor 90, FLASH memory 156, and RAM 158 together form a computer architecture. Referring to Figure 8, this architecture is shown generally at 162.

Figure 9

Referring to Figure 9, the event parser files in the event parser directory establish an event parser thread as shown generally at 220. The event parser thread includes a read comm port instance 222 which directs the system microprocessor 90 shown in Figure 4, to communicate with the telephony microcontroller to read the FSK receiver 150 to determine whether or not an FSK message is being received at the FSK receiver 150. If a message is not being received, the event parser thread is blocked on the read comm port instance 222. If the FSK receiver 150 is receiving an FSK message, such message is passed to the system microprocessor and stored in the FSK receive buffer 200.

The event parser thread then includes a checksum instance 224 which directs the processor to read the contents of the FSK receive buffer 200 to determine whether or not the message was received properly. If the message was not received properly, it is ignored and the processor is directed back to the read comm port instance 222.

If the message was received properly, the processor is directed to a CPE ID match instance 226 in which the contents of the CPE ID register 210 stored in the FLASH memory 156 is compared against the contents of the CPE ID field of the FSK message stored in the FSK receive buffer 200. If the CPE IDs do not match, the processor is returned to the read comm port instance 222.

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If the CPE IDs match, a no activity instance 228 directs the processor to determine whether or not a user has initiated any activity at the telephone within the last ten minutes.

5

If the user has not made use of the telephone within the last ten minutes an EIU instance 230 directs the system microprocessor 90 to communicate with the telephony microcontroller 92, causing it to determine whether or not the EIU signal provided by either of the EIU detectors 118 and 154 shown in Figure 5, indicates that an extension is in use. If so, then the processor is directed back to the read comm port instance 222. If an extension is not in use, then the processor is directed to a store parameter type instance 232 which directs the processor to store the contents of the parameter type field and the contents of the data field in the variable buffer 202. Thus, the first network resource locator is copied to the variable buffer 202. The event parser thus acts as a receiver or means for receiving an FSK message having a first network resource locator identifying the first resource. It also acts as means for extracting the first uniform resource locator from the FSK message. The system microprocessor 90 is then directed to a copy instance 234 which directs it to copy the contents of the variable buffer 202 to the main event handler buffer 204. The processor is then returned back to the read comm port instance 222 where it blocks until a further FSK message is received.

30

Figure 10

Main event handler thread

Referring to Figure 10, the main event handler files in the main event handler subdirectory 183 establish a main event handler thread as shown generally at 240. The main event handler thread includes a buffer loaded instance 242 which directs the system microprocessor 90 to determine whether or not the main event handler buffer 204 shown in Figure 7

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is full. If this buffer is not loaded then the processor blocks on the buffer loaded instance 242.

5 If the main event handler buffer is loaded, the processor is directed to a lookup table instance 244 which directs the processor to find an event code record in the event code lookup table 208 shown in Figure 6, having parameter type field 211 contents corresponding to the contents of the parameter type field in the main event handler buffer
10 204 shown in Figure 7.

On finding such an event code record, the system microprocessor 90 is directed to a copy event code instance 246 which directs the processor to copy the contents of the
15 event code field 213 from the event code record into the event queue buffer 206 shown in Figure 7 and also to copy the contents of the data field 209 of the main event handler buffer 204 shown in Figure 7 to the event queue buffer 206 in association with the event code. Thus, the
20 processor stores, in the event queue buffer 206, a first event record including an event code from the event code lookup table 208 and data from the data field 250 of the main event handler buffer 204 shown in Figure 7.

25 Figure 11

Referring to Figure 11, the event dispatcher files in the main event handler subdirectory 183 shown in Figure 6 establish an event dispatcher thread as shown generally at 180. The event dispatcher thread includes a first instance
30 which directs the system processor to address the next event code record in the event queue buffer 206 shown in Figure 7. The system processor is then directed to instance 184 which directs it to determine which threads have registered for the event code record addressed at
35 instance 182. The registration of threads with event code records is assumed to have been previously accomplished according to conventional practices. After having

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determined which threads have registered for the current event code record, instance 186 directs the processor to communicate the current event code record from the event queue buffer 206 to the registered threads. In this manner, data is passed from the event queue buffer 206 to appropriate threads.

Figure 12

Referring to Figure 12, a browser thread 260 is implemented by the browser files in the browser subdirectory 185 shown in Figure 6. The browser thread includes a pend instance 262 which directs the processor to pend for receipt of a URL event code record from the event dispatcher thread 180 shown in Figure 11. The event dispatcher in conjunction with the event parser and the main event handler and the processor 90, thus cooperate to present the first uniform resource locator from the FSK message to the browser.

On receipt of a URL event code record from the event dispatcher thread, a request instance 264 directs the system microprocessor 90 to request a connection to a world-wide web resource specified by the URL in the data field 250 of the event record. Such connection is requested using classes in the Java.net package of the Java virtual machine.

Figure 13

Referring to Figure 13, if a connection is requested by an application, the network driver 270 included within the operating system file 165 shown in Figure 6 is run. The network driver task includes a first instance 272 which directs the system microprocessor 90 to pend awaiting a connection request from the browser thread shown in Figure 12.

On receiving a connection request, instance 274 directs the system microprocessor 90 to check the routing table 155

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shown in Figure 7 to determine whether or not a network connection has already been established. Referring to Figure 13, if no such connection has been established, instance 276 directs the system microprocessor 90 to
5 command the modem 130 to connect to the subscriber line 58 to place a telephone call over the public switched telephone network to the Internet services provider 24 shown in Figure 1.

10 Referring back to Figure 13, establishment of a connection with the Internet services provider involves a handshaking instance 278.

On establishing connection with the Internet services
15 provider, instance 280 directs the processor to negotiate a point to point protocol (PPP) connection with the Internet services provider and to store the details of the PPP connection in the routing table 155. A network connection is thus created. The network driver, processor
20 90 and modem 130 thus cooperate to act as means for using the second telephone line interface for communicating on the network.

Instance 282 then directs the system microprocessor 90 to
25 notify the requesting application of the connection to the resource specified by the URL in the data field 250 of the event record.

On completion of transmission of the details to the browser
30 thread, the system microprocessor 90 is directed back to instance 272 where it pends on receipt of a further connection request from the browser thread.

It should be noted that at instance 274, where the
35 processor is directed to determine whether or not a connection has already been established, if such a connection has already been established, the processor is

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directed directly to instance 282 where it notifies the requesting application of such connection.

Referring back to Figure 12, notification of the connection
5 established by the network driver task shown in Figure 13 is received at instance 290 in Figure 12.

Still referring to Figure 12, if no connection has been made and no connection can be established, instance 292
10 directs the system microprocessor 90 to display an error banner to indicate that the connection could not be established. The processor is then returned back to the pend instance 262.

15 If at instance 290, notification of a connection has been established, instance 294 directs the processor to download and decode an HTML file including an applet including a second network resource locator from the first resource. The HTML file is received and stored in the
20 temporary directory 173 in the FLASH 156. The browser and system processor thus act as means for downloading from a first resource identified by a first network resource locator, an applet including a second network resource locator.

25 Instance 295 then directs the processor to determine whether or not the HTML file has been successfully decoded, according to well known browser decoding criteria. In this embodiment, the browser includes a security manager which
30 imposes restrictions on what hosts any applets within the HTML file can communicate with. In particular in this embodiment, applets are restricted from reading or writing to the flash memory shown in Figure 6. Applets may only open socket connections to the host that served them. They
35 are not permitted to open server sockets themselves, they are not permitted to start other processes on the local host and they are not permitted to have native methods.

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The security manager thus acts as means for preventing running applets from accessing the memory.

If the HTML file was not successfully decoded, the processor is directed to the error banner instance 292. If the HTML file was successfully decoded, instance 296 directs the processor to spawn threads on each applet, if any, contained in the HTML file. After spawning such threads, the processor is returned to the pend instance 262. The browser and processor 90 thus act as means for running the applet.

Figure 14

Referring to Figure 14, an applet thread, such as spawned at instance 296 of the browser thread shown in Figure 12, is shown generally at 310 in Figure 14. The applet thread includes a first instance 312 which directs the system microprocessor 90 to pass a pre-stored, second uniform resource locator (URL) contained within the applet to the public interface method shown in Figure 15. Instance 314 then directs the processor to pend, awaiting a completion notice from the public interface method shown in Figure 14.

Figure 15

Referring to Figure 15, the public interface method is shown generally at 320 and begins with instance 324 which directs the system microprocessor 90 to receive the second URL from the calling applet. The public interface method thus acts as means for communicating with the applet to receive the second network resource locator from the applet. Instance 326 then directs the processor to create a download event code record in the event queue buffer 206 shown in Figure 7. The download event record includes a download event code, the URL received from the applet and a password. Instance 328 then directs the processor to pend for receipt of a completion notice from the handler thread shown in Figure 16.

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Figure 16

Referring to Figure 16, the handler thread is shown generally at 400 and includes a first instance 402 at which it pends on receipt of a download event record from the event dispatcher shown in Figure 11. (In the description thus far, the download event record was entered into the event queue by the public interface method.)

Upon receipt of a download event record, instance 404 compares the password from the download event record with a pre-defined password, and if the password does not match, instance 412 directs the processor to send a message to the public interface to indicate that a download could not occur.

If at instance 404 the password is authenticated, instance 406 directs the processor to receive files using the file transfer protocol, from the resource identified by the URL.

At the second network resource specified by the second URL, files operable to be downloaded are named and formatted into directories of the same names as those in the FLASH memory 156 of the telephone and are grouped into Java file packages named after the corresponding directories. The Java file packages are compressed according to the ZIP (tm) algorithm and are stored at the second resource as ZIP files named after the corresponding file packages. The ZIP files are transmitted to the system microprocessor 90 in the telephone, using the file transfer protocol.

When the ZIP files are received at the system processor, they are un-compressed or exploded and are stored in the temporary subdirectory 173. Instance 404 of the handler thus acts as means for decompressing the file from the second network resource to produce a plurality of decompressed files. More generally, the handler and processor act as means for communicating with a second

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network resource identified by the second network resource locator to receive and store in the memory, a file from the second network resource.

5 Instance 408 then directs the processor to verify and check the files received by determining whether or not checksums match and whether or not the un-compressed files have acceptable package names. Instance 408 thus acts as means for verifying the file has been received in accordance with
10 pre-defined criteria. The package names thus act as passwords which are compared against predefined passwords which, in this embodiment, are the directory names in the FLASH memory. If the files do not have acceptable package names, instance 410 directs the processor to remove the
15 files from the temporary storage directory and to proceed to instance 412 to notify the public interface that the files are not acceptable.

If the files are acceptable, instance 414 directs the
20 processor to move them from the temporary directory to the appropriate directories in the file system, as determined by the names and directory structures associated with the files. The handler thread thus acts as means for extracting a password from the file and for comparing the
25 password against a pre-defined password and to store the file in the memory when the password matches the pre-defined password and means for extracting a filename from the file from the second resource and for loading the file into an area of memory associated with the filename, where
30 the area of memory associated with the filename is the corresponding directory in the FLASH memory 156.

After the files have been moved, instance 416 directs the
processor to notify the public interface method of
35 completion and the processor is returned to the pend instance 402.

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Referring back to Figure 15, when the notice of completion from the handler thread is received at instance 328, instance 330 directs the processor to notify the applet thread shown in Figure 14, of completion and the public interface method shown in Figure 15 is completed.

The applet thread shown in Figure 14 is thus notified of completion at instance 314 and the applet thread is completed.

10

Operation

Referring to Figure 1, the content provider 26 includes a web server 350 and a database of compressed files 352 containing Java classes for implementing the Java applications in the applications subdirectory 175 shown in Figure 6. The compressed files are compressed according to the ZIP(tm) format and may include directories of files. Thus, entire directories and files are zipped into a compressed format and are stored as a single file in the database.

20

The first Java applet provider 25 includes a web server 354 and a plurality of Java applets 356 containing uniform resource locators identifying the first content provider and compressed files stored in the content provider database files 352.

25

Referring to Figure 2, the feature records 40 have URL fields 50 which identify the individual applets 356 at the Java applet provider 25 shown in Figure 1. Thus, when a user requests an additional feature such as email capability, fax interface, screen saver, etc., the user pays an administrator of the service, and the administrator enters at the administrator terminal 34 shown in Figure 2, a request for a change in service, the user's telephone number, the CPE ID of the equipment to be changed and an identification of the desired feature. In response, the

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SRA server 16 dispatches an SRA message on public packet switched network link 66, in the format shown at 31 in Figure 3.

- 5 Referring back to Figure 1, the SRA message is received at the central office service unit 18 which establishes a connection between it and the central office switch 22 over the trunk 68 enjoying a special class of service to establish a suppressed ring access connection to the user
10 telephone 20. When such connection has been made, the central office service unit 18 sends a suppressed ring connection message as shown generally at 70 in Figure 3, to the telephone 20 as shown in Figure 1.
- 15 The telephone receives the SRC message 70 through the event parser thread 220 shown in Figure 9 and the main event handler thread 240 shown in Figure 10 which load the event queue buffer 206 with a URL event code and the contents of the parameter data field 82 which contains the URL of an
20 HTML file 356 containing a Java applet at the Java applet provider 25 as shown in Figure 1. The HTML file includes an applet with a URL identifying a file on the first content provider 26.
- 25 Referring to Figures 1 and 12, the browser thread 260 directs the system microprocessor 90 to establish a connection with the Internet services provider 24 and the network driver 270 shown in Figure 13 establishes a network connection between the telephone 20 and the Java applet
30 provider 25 through the central office switch 22, the Internet services provider 24 and the world-wide web 23. The Java applet provider 25 transmits the HTML file containing the applet back to the telephone 20 and such HTML file is received in the temporary directory 173 shown
35 in Figure 6. The browser thread 260 then spawns applet threads on each applet included in the HTML file received.

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The applets provided by the Java applet provider 25 include uniform resource locators identifying compressed files 352 at the content provider 26 and thus referring to Figure 14, the applet calls the public interface method 320 shown in Figure 15 and passes to the public interface method, the URL of the first file in the content provider 26 shown in Figure 1.

The public interface method 320 then creates a download event record in the event queue buffer 206 shown in Figure 7, indicating that a URL event has occurred and specifies the URL provided by the applet for use by the handler thread 400 in Figure 16.

The handler thread 400 receives the URL event code from the event dispatcher shown in Figure 11 and makes a connection to the first content provider 26. The file identified by the URL is transmitted back to the telephone 20 using the file transfer protocol. Instance 408 verifies the file as being an approved type for inclusion in the extensions subdirectory 177 shown in Figure 6 and the file is copied from the temporary subdirectory 173 into the appropriate sub-directory within the extensions subdirectory 177. The classes contained with the file may then interact within other classes within the system directory 167 and control system resources to effect the new functionality requested by the user.

It will be appreciated that files for implementing certain functions such as email, fax interface and the like, are relatively large files including many kilobits of program code. Thus, use of the suppressed ring access connection to transmit to the telephone the location of an applet identifying a further location, where such a relatively large file is located, effectively enables a telephone to be informed that a file is to be downloaded. The subsequent downloading of the file using the applet and the

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content provider is done using the modem for data transfer rather than by simple FSK messaging which would take an inordinately long time to transfer such large files. Thus, the FSK messaging is merely used to initiate the download process and the actual download process takes place according to conventional rules for high speed data transmission using modems.

The use of the applet server, rather than directly accessing the content provider, in conjunction with a level of security which prevents applets from access to system resources within the telephone ensures that system resources are guarded from control by programs and applets not authorized to access system resources.

15

Second embodiment

Referring to Figure 1, in accordance with a system according to a second embodiment of the invention, there is provided the entire system as described in the first embodiment with the further inclusion of a second Java applet provider 360 having a web interface 362 and a plurality of HTML files 364 containing Java applets and advertising content or advertisements. In addition, this system includes a second content provider shown generally at 366 including a web interface 368 and a plurality of advertising content or marketing HTML files 370. In this embodiment, the applets 364 include uniform resource locators pointing to respective marketing HTML files 370 at the second content provider 366 and methods for directing the system processor to display such marketing HTML files on the display 102.

In this second embodiment, the system works generally as described above with the exception that one of the HTML files 370 is received from the second content provider at instance 406 of the handler thread 400 of Figure 16. After the HTML file is loaded into the marketing directory, an

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applet contained therein is run under the browser, which retrieves the advertisement and displays it on the display 102, such that the advertisement occupies the entire display, with no navigation tool icons or the like to obstruct it.

Thus, the entire content of the HTML file from the content provider is displayed on the display 102. In this manner, marketing or advertising content is automatically displayed on the display. The browser has no navigation tools or buttons and, therefore, the advertisement is displayed unobstructed.

The HTML file may include a plurality of links which the user can select using an input device (not shown) and such links may be used by the browser to connect to another resource on the world-wide web or to connect to a resource within the telephone itself. Such resource within the telephone itself would be stored in a sub-directory of the system subdirectory 167 shown in Figure 6.

Applets may be used to create animated marketing advertisements or presentations which may be more appealing to a user. In addition, high resolution pictures may be included within the HTML file as GIF files or the like.

As HTML pages are for use on display screens of a predefined aspect ratio, advertising for use on telephones of the type described, can be simply and easily developed using conventional HTML page development techniques. This facilitates convenient creation of advertising content for the telephone.

Alternatively, the application sub-directory 175 may include applications which automatically cause HTML files locally stored in the marketing subdirectory 205 to be displayed for marketing purposes by creating, in the event

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queue buffer 206, an event record including a URL event code and a URL specifying a resource within the FLASH memory 156. In this manner, the display of HTML pages can occur autonomously from within the telephone and may
5 initiate the display of HTML files stored within the directory structure or stored at an external resource location.

Effectively, the invention simplifies the download of a
10 single compressed file, including a bundle of files. This allows multiple files and subdirectories to be downloaded to the telephone in a single, quick file transfer. The software bundle guarantees that all necessary files are downloaded. Security is also enforced by refusing any
15 downloads except from password protected applets.

The invention described provides advantages in enabling field up-gradable software components, extensible applications and the ability to dynamically run Java
20 applets. Any system file components of the telephone can be upgraded without the need to upgrade the entire software load. This allows service providers to change specific pieces of the telephone in short downloads thereby changing, removing or adding functionality to the
25 application. The telephone is also easily extendible using Java plug-ins. Such plug-ins may be designed to integrate into the telephone software and allow third party developers to add functionality to the telephone. In addition, Java applets allow network based providers to use
30 standard interfaces provided on the telephone. This allows Java applets to perform basic telephone functions such as dialling a telephone number. Java applets also have access to the same basic graphical components as the telephone application so that applets can be made to look the same as
35 the main application.

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While specific embodiments of the invention have been described and illustrated, such embodiments should be considered illustrative of the invention only and not as limiting the invention as construed in accordance with the
5 accompanying claims.

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**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

- 5 1. A method of downloading files from a network into
memory in communication with a processor operable to
communicate on the network, the method comprising the
steps of:
 - 10 a) downloading to said processor from a first
resource identified by a first network resource
locator, an applet including a second network
resource locator;
 - 15 b) running said applet on said processor;
 - c) receiving said second network resource locator
from said applet;
 - 20 d) preventing applets running on said processor from
accessing said memory; and
 - 25 e) establishing communication between said processor
and a second network resource identified by said
second network resource locator to receive and
store in said memory, a file from said second
network resource.
- 30 2. A method as claimed in claim 1 further including the
step of decompressing said file from said second
network resource to produce a plurality of
decompressed files.
- 35 3. A method as claimed in claim 2 further including the
step of verifying said file has been received in
accordance with pre-defined criteria.

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4. A method as claimed in claim 3 further including the
step of extracting a password from said file and
comparing said password with a predefined password and
storing said file in said memory when said password
5 matches said predefined password.
5. A method as claimed in claim 4 further including the
step of extracting a filename from said file from said
second resource and loading said file into an area of
10 memory associated with said filename.
6. A method as claimed in claim 1 further including the
step of receiving an FSK message having said first
network resource locator identifying said first
15 resource.
7. A method as claimed in claim 6 further including the
step of receiving said FSK message from a first
telephone line.
20
8. A method as claimed in claim 7 further including the
step of extracting said first uniform resource locator
from said FSK message for presentation to said
processor for use in downloading.
25
9. A method as claimed in claim 8 further including the
step of using a second telephone line interface for
communicating on said network.
- 30 10. An apparatus for downloading files from a network into
memory in communication with a processor operable to
communicate on the network, the method including the
steps of:
35 a) means for downloading to said processor from a
first resource identified by a first network

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resource locator, an applet including a second network resource locator;

- 5 b) means for running said applet on said processor;
- c) means for receiving said second network resource locator from said applet;
- 10 d) means for preventing applets running on said processor from accessing said memory; and
- e) establishing communications between said processor and with a second network resource identified by said second network resource locator to receive and storing in said memory, a
- 15 file from said second network resource.
11. An apparatus as claimed in claim 10 further including means for decompressing said file from said second
- 20 network resource to produce a plurality of decompressed files.
12. An apparatus as claimed in claim 11 further including means for verifying said file has been received in
- 25 accordance with pre-defined criteria.
13. An apparatus as claimed in claim 12 further including means for extracting a password from said file and for comparing said password with a pre-defined password
- 30 and storing said file in said memory when said password matches said pre-defined password.
14. An apparatus as claimed in claim 13 further including means for extracting a filename from said file from
- 35 said second resource and load said file into an area of memory associated with said filename.

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15. An apparatus as claimed in claim 10 further including means for receiving an FSK message having said first network resource locator identifying said first resource.
- 5 16. An apparatus as claimed in claim 15 further including means for receiving said FSK message from a first telephone line.
- 10 17. An apparatus as claimed in claim 16 further including means for extracting said first uniform resource locator from said FSK message for presentation to said processor for use in downloading.
- 15 18. An apparatus as claimed in claim 17 further including means for using a second telephone line interface for communicating on said network.
- 20 19. A computer readable medium on which is stored a plurality of computer readable codes representing instructions for directing a processor to download files from a network into memory in communication with said processor, said processor being operable to communicate on the network, said instructions directing said processor to:
- 25
- 30 a) implement a browser operable to download to said processor from a first resource identified by a first network resource locator, an applet including a second network resource locator;
- 35 b) run said applet on said processor;
- c) receiving said second network resource locator from said applet;

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- d) prevent applets running on said processor from accessing said memory; and
 - e) communicate with a second network resource identified by said second network resource locator to receive and store in said memory, a file from said second network resource.
- 5
20. A computer readable medium as claimed in claim 19 further including a plurality of computer readable codes for directing said processor to decompress said file from said second network resource to produce a plurality of decompressed files.
- 10
21. A computer readable medium as claimed in claim 20 further including a plurality of computer readable codes for directing said processor to verify said file has been received in accordance with pre-defined criteria.
- 15
22. A computer readable medium as claimed in claim 21 further including a plurality of computer readable codes for directing said processor to extract a password from said file and compare said password against a pre-defined password and to store said file in said memory when said password matches said pre-defined password.
- 20
23. A computer readable medium as claimed in claim 22 further including a plurality of computer readable codes for directing said processor to extract a filename from said file from said second resource and load said file into an area of memory associated with said filename.
- 25
24. A computer readable medium as claimed in claim 19 further including a plurality of computer readable
- 30
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codes for directing said processor to receive an FSK message having a first network resource locator identifying said first resource and receive said first network resource locator from said FSK receiver.

- 5
25. A computer readable medium as claimed in claim 24 further including a plurality of computer readable codes for directing said processor to receive said FSK message from a first telephone line and provide
- 10 said FSK message to said FSK receiver.
26. A computer readable medium as claimed in claim 25 further including a plurality of computer readable codes for directing said processor to extract said
- 15 first uniform resource locator from said FSK message for presentation to said browser.
27. A computer readable medium as claimed in claim 26 further including a plurality of computer readable
- 20 codes for directing said processor to use a second telephone line interface for communicating on said network.
28. A file download apparatus for downloading files from
- 25 a network into memory, said apparatus including a processor operable to communicate on the network, said processor running:
- 30 a) a browser for downloading from a first resource identified by a first network resource locator, an applet including a second network resource locator;
- b) an applet viewer for running said applet;
- 35

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- c) a public interface for communicating with said applet to receive said second network resource locator from said applet;
- 5 d) a security manager for preventing running applets from accessing said memory; and
- e) a handler having access to said memory, said handler being in communication with said public
10 interface, for communicating with a second network resource identified by said second network resource locator to receive and store in said memory, a file from said second network resource.
- 15 29. An apparatus as claimed in claim 28 wherein said handler is operable to decompress said file from said second network resource to produce a plurality of decompressed files.
- 20 30. An apparatus as claimed in claim 29 wherein said handler is operable to verify said file has been received in accordance with pre-defined criteria.
- 25 31. An apparatus as claimed in claim 30 wherein said handler is operable to extract a password from said file and compare said password against a pre-defined password and to store said file in said memory when said password matches said pre-defined password.
- 30 32. An apparatus as claimed in claim 31 wherein said handler is operable to extract a filename from said file from said second resource and load said file into an area of memory associated with said filename.
- 35 33. An apparatus as claimed in claim 21, further including an FSK receiver for receiving an FSK message having a

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first network resource locator identifying said first resource and wherein said browser is operable to receive said first network resource locator from said FSK receiver.

5

34. An apparatus as claimed in claim 33 further including a first telephone line interface for receiving said FSK message from a first telephone line and for providing said FSK message to said FSK receiver.

10

35. An apparatus as claimed in claim 34 further including an event parser for extracting said first uniform resource locator from said FSK message for presentation to said browser.

15

36. An apparatus as claimed in claim 35 further including a second telephone line interface, said processor using said second telephone line interface for communicating on said network.

20

37. A method of remotely configuring a telephone having a processor operable to communicate on a network and memory accessible by said processor for storing groups of processor readable codes for directing said processor to effect telephone functionality, the method including the steps of:

25

a) downloading to said processor from a first network resource on the network, an applet including a second network resource locator;

30

b) running said applet on said processor;

c) to receiving said second network resource locator from said applet;

35

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- d) preventing applets running on said processor from accessing said memory; and
 - e) establishing communications between said processor and a second network resource identified by said second network resource locator to receive and storing in at least one of said groups, a file from said second network resource.
38. A remotely configurable telephone having a processor operable to communicate on a network and memory accessible by said processor for storing groups of processor readable codes for directing said processor to effect telephone functionality, said processor being programmed to run:
- a) a browser for downloading to said processor from a first network resource on the network, an applet including a second network resource locator;
 - b) an applet viewer for running said applet on said processor;
 - c) a public interface for communicating with said applet to receive said second network resource locator from said applet;
 - d) a security manager for preventing applets running on said processor from accessing said memory; and
 - e) a handler providing said processor access to said memory, said handler being in communication with said public interface, for communicating with a second network resource identified by said second network resource locator to receive and store in

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at least one of said groups, a file from said second network resource.

39. An apparatus for remotely configuring a telephone having a processor operable to communicate on a network and memory accessible by said processor for storing groups of processor readable codes for directing said processor to effect telephone functionality, the method including the steps of:
- a) downloading to said processor from a first network resource on the network, an applet including a second network resource locator;
 - b) running said applet on said processor;
 - c) receiving said second network resource locator from said applet;
 - d) preventing applets running on said processor from accessing said memory; and
 - e) establishing communications between said processor and a second network resource identified by said second network resource locator to receive and store in at least one of said groups, a file from said second network resource.
40. A computer readable medium on which is stored a plurality of computer readable codes representing instructions for directing a processor to remotely configure a telephone having a processor operable to communicate on a network and memory accessible by said processor for storing groups of processor readable codes for directing said processor to said processor

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to effect telephone functionality, the instructions directing said processor to:

- 5 a) download from a first network resource on the network, an applet including a second network resource locator;
- b) run said applet;
- 10 c) communicate with said applet to receive said second network resource locator from said applet;
- d) prevent running applets from accessing said memory; and
- 15 e) communicate with said public interface, to communicate with a second network resource identified by said second network resource locator to receive and store in at least one of
- 20 said groups, a file from said second network resource.

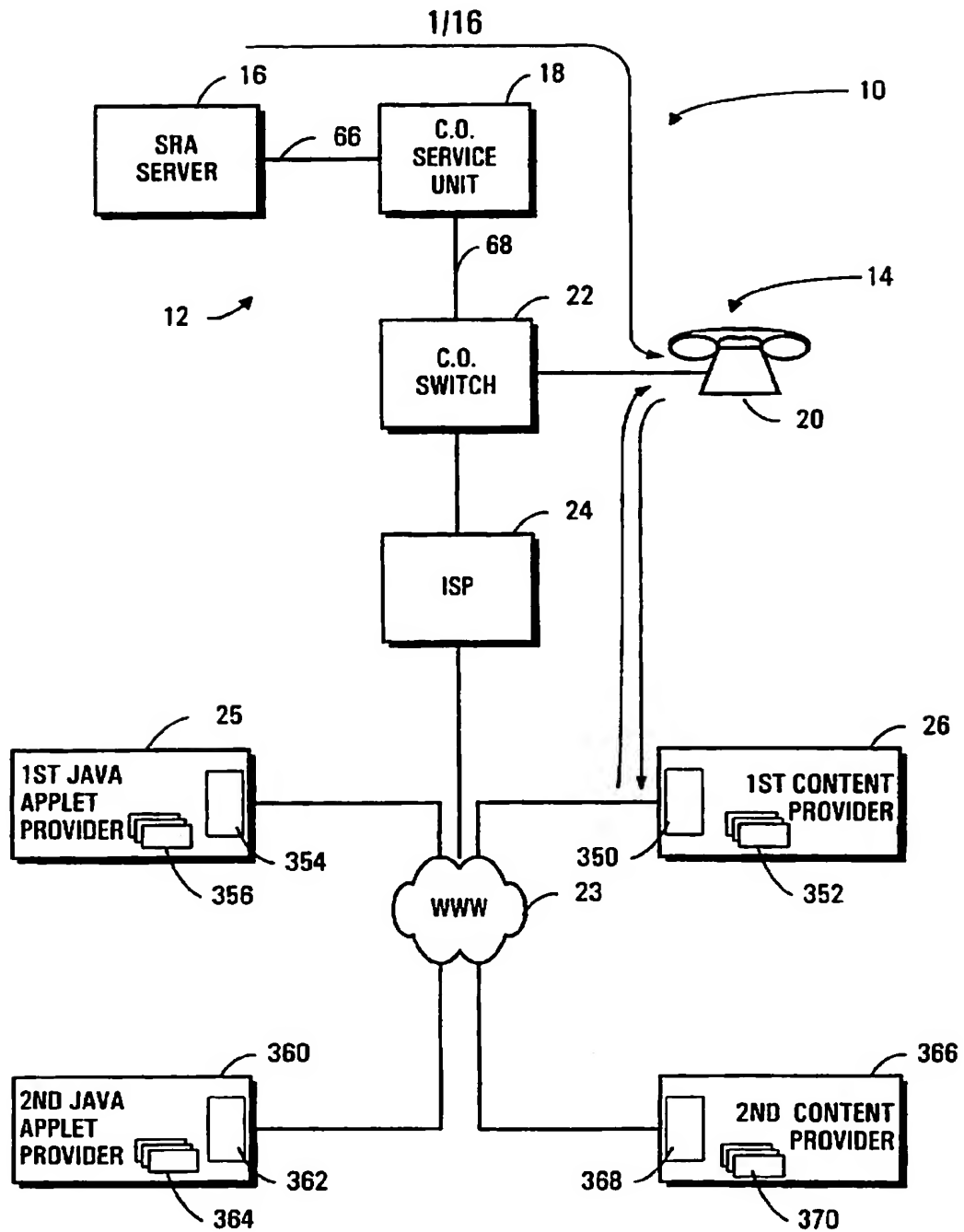


FIG. 1

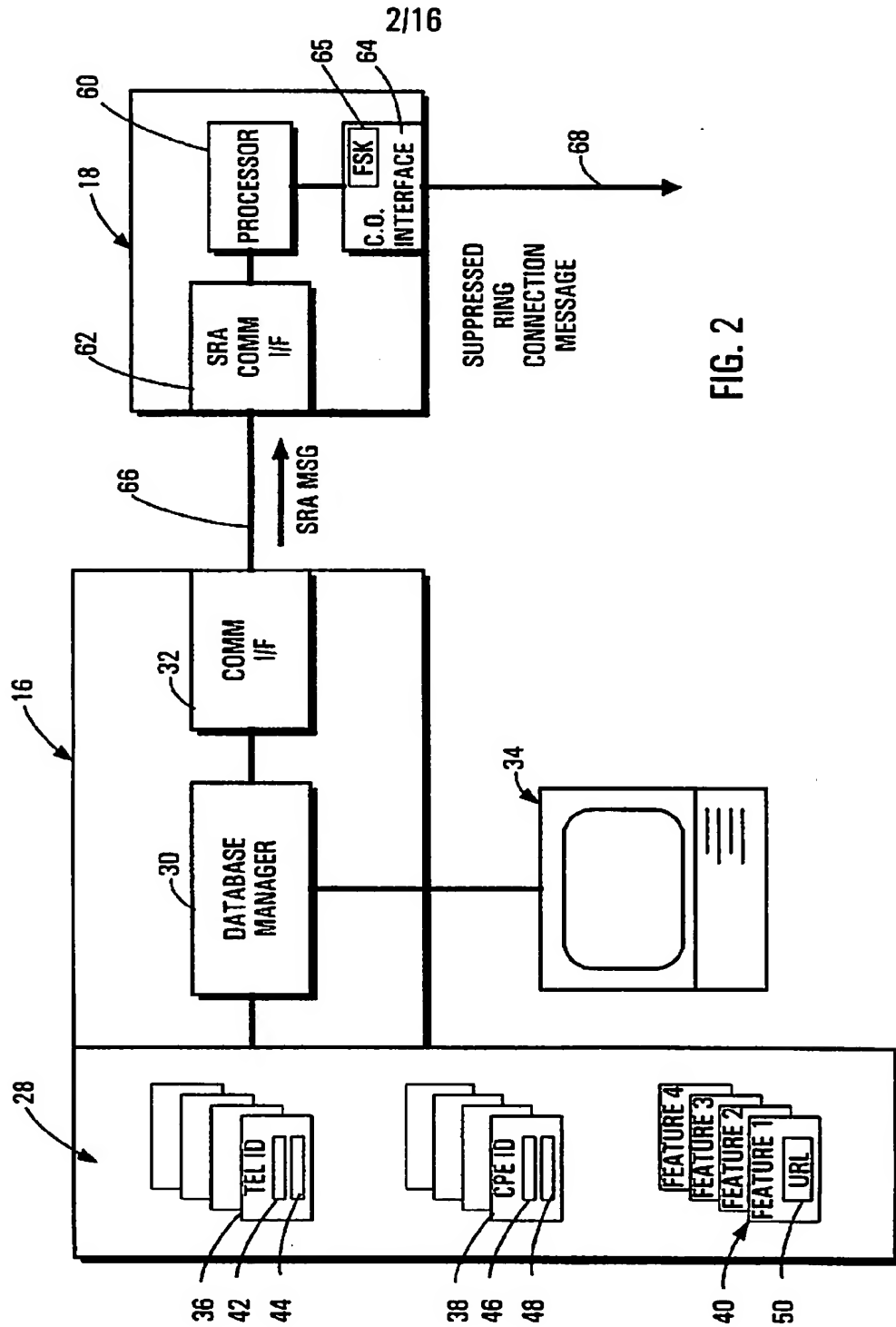


FIG. 2

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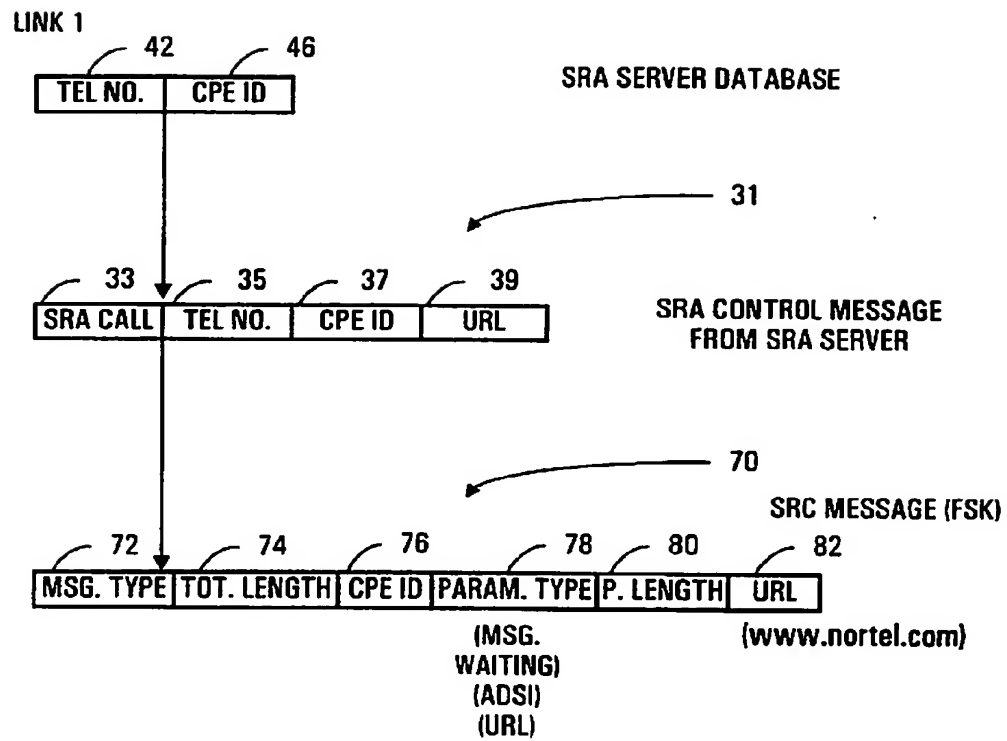
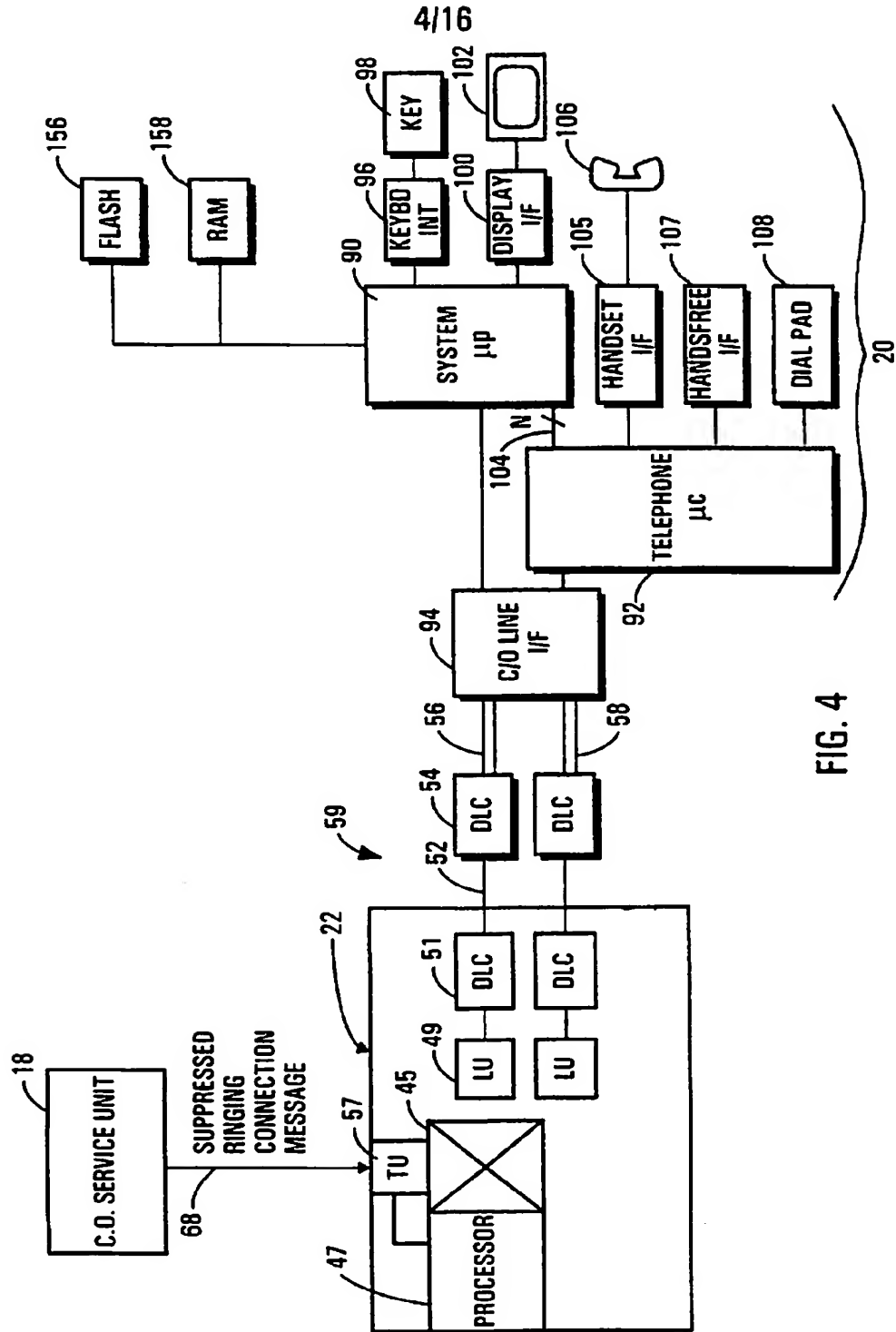


FIG. 3



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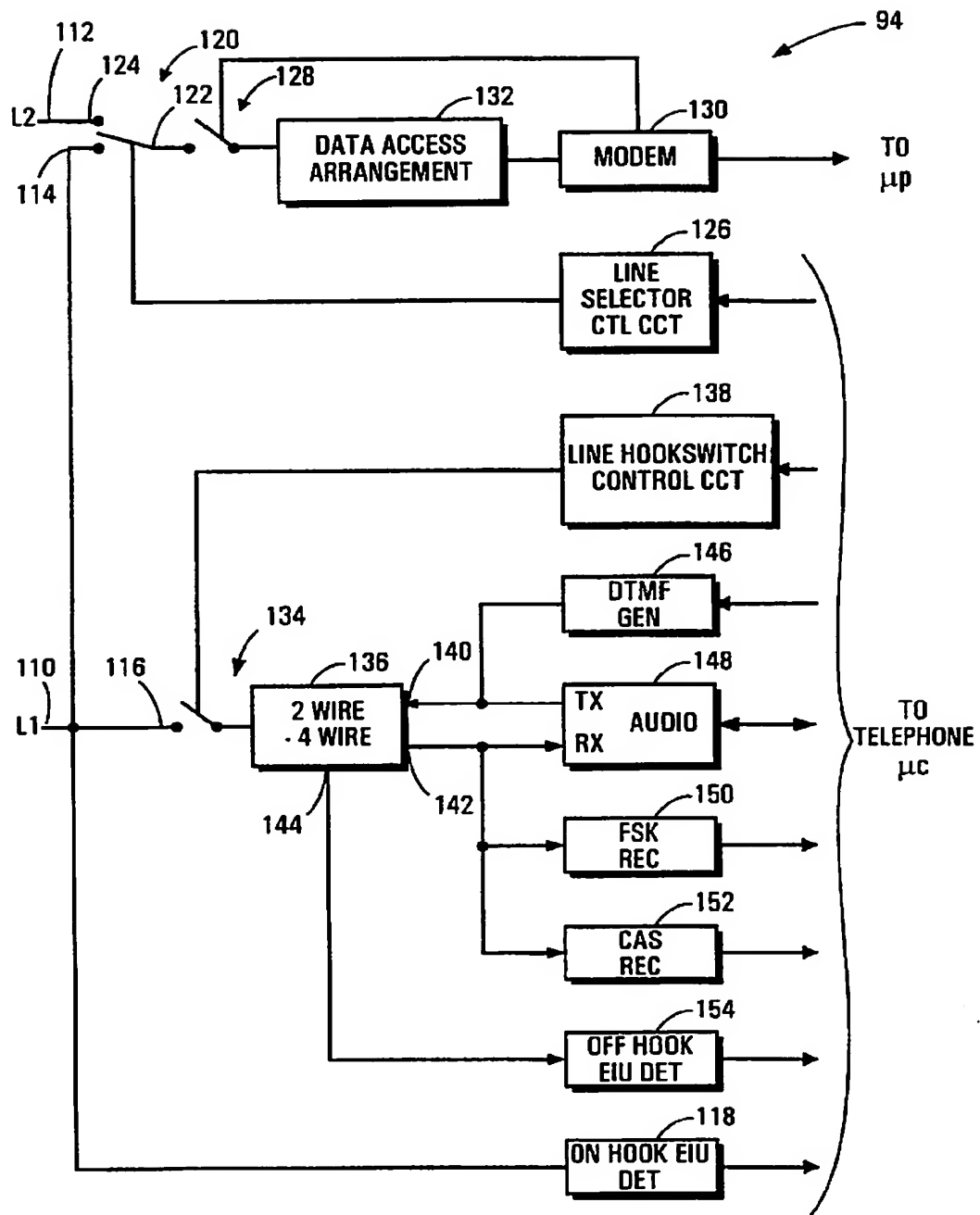


FIG. 5

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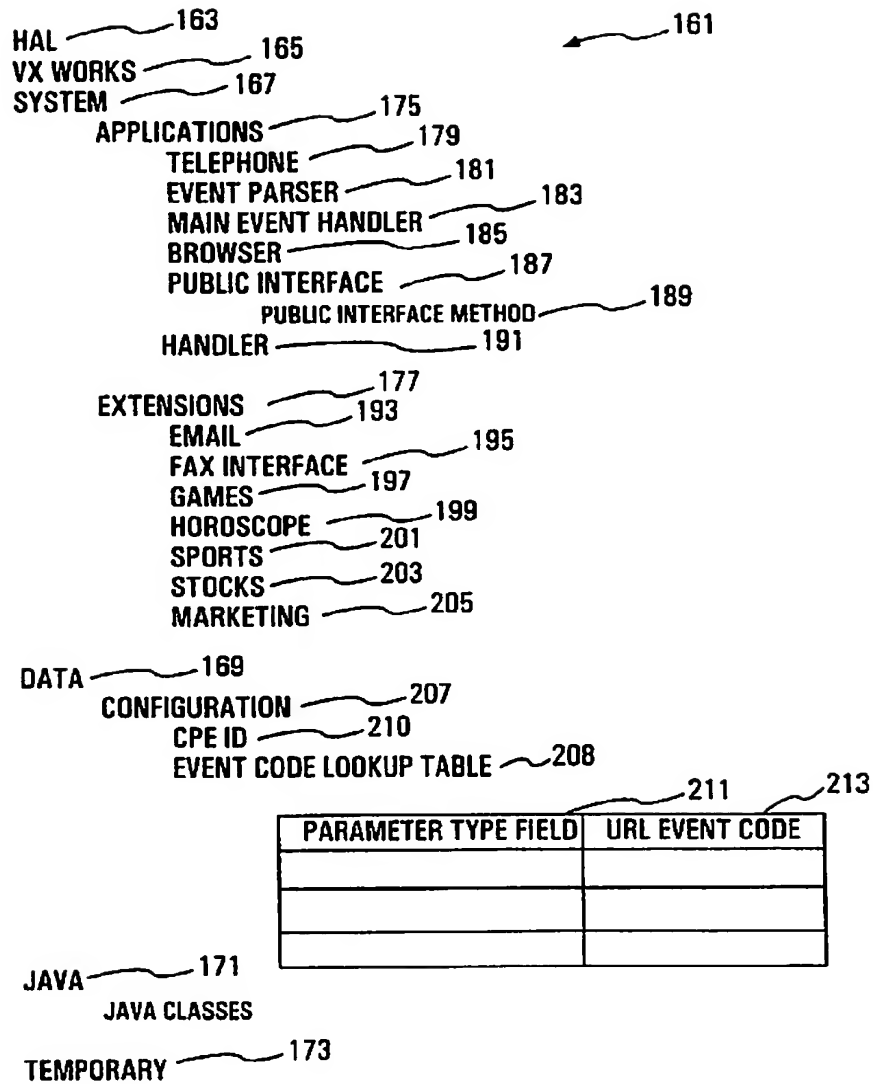


FIG. 6

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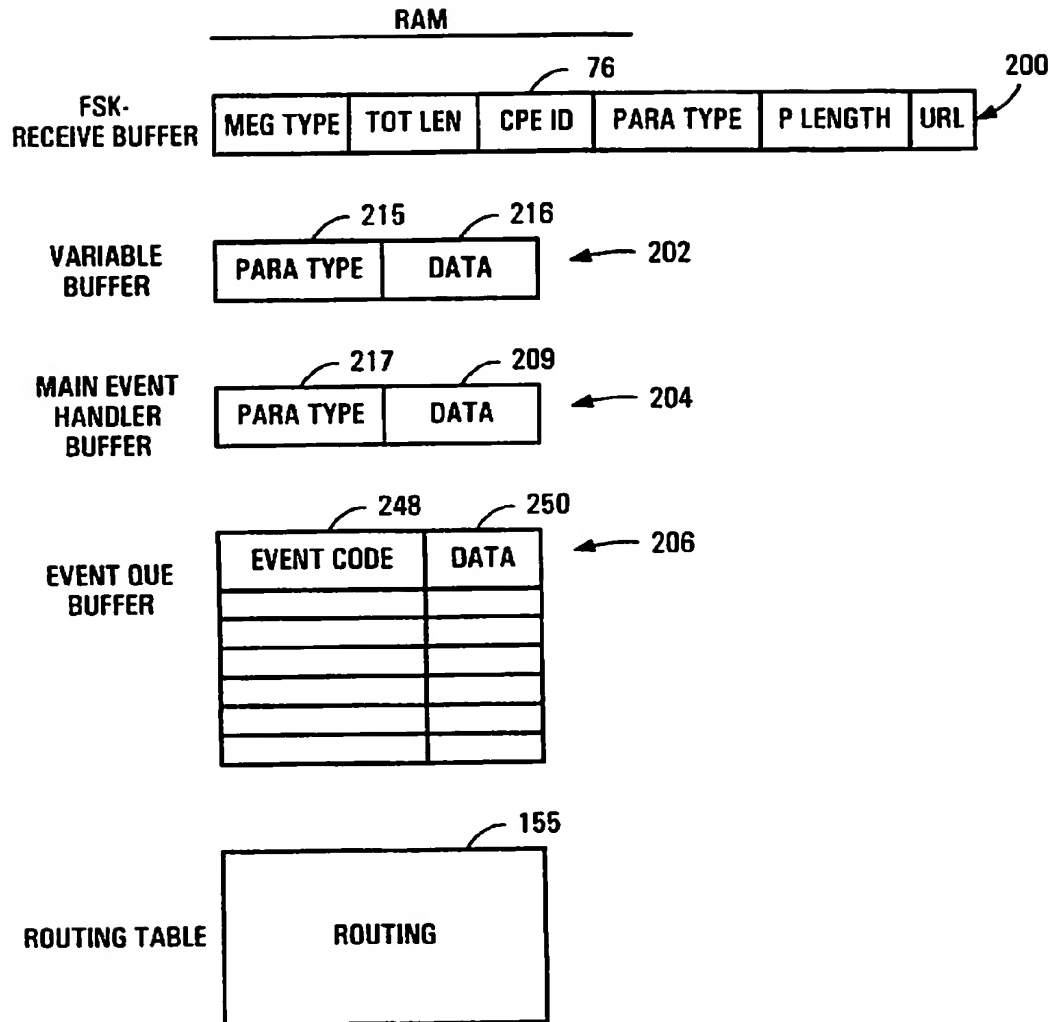
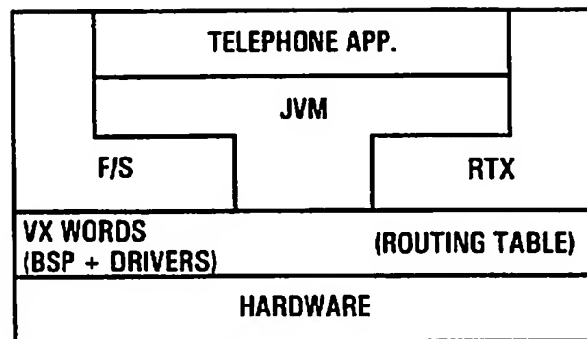


FIG. 7

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F/S - FLASH FILE
JVM - JAVA VIRTUAL MACHINE
RTX - REAL TIME XSERVER

FIG. 8

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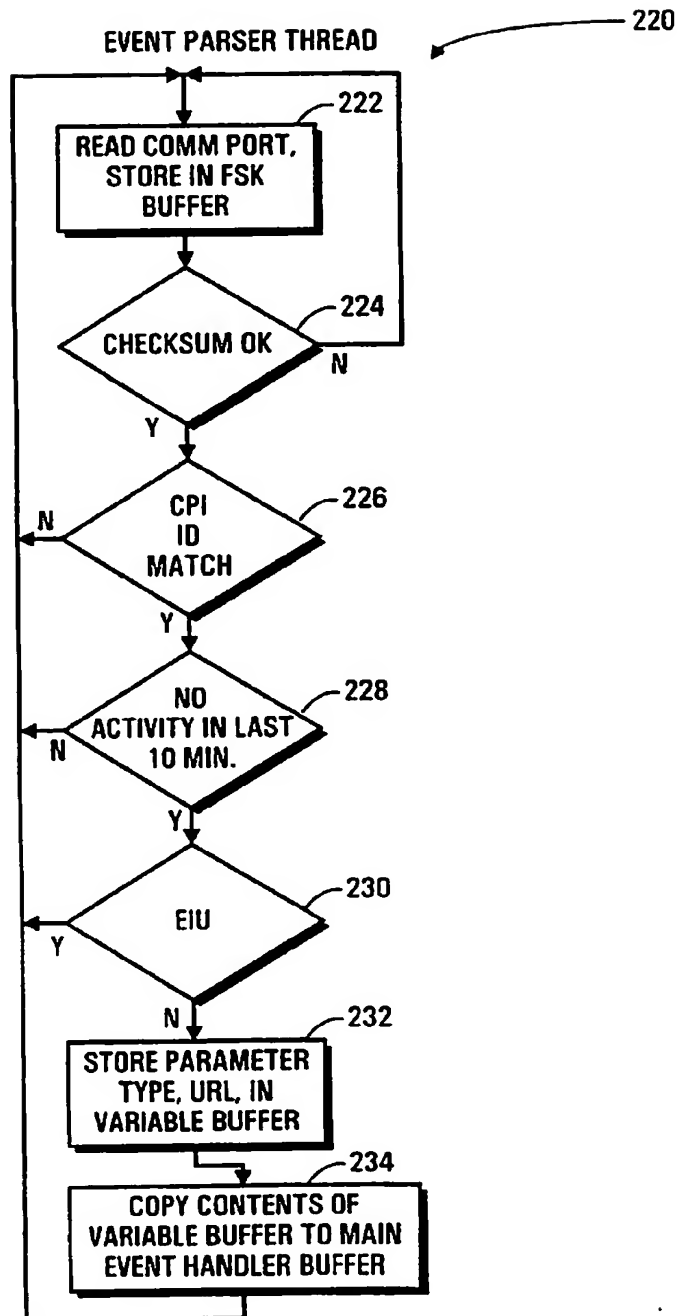


FIG. 9

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MAIN EVENT HANDLER THREAD

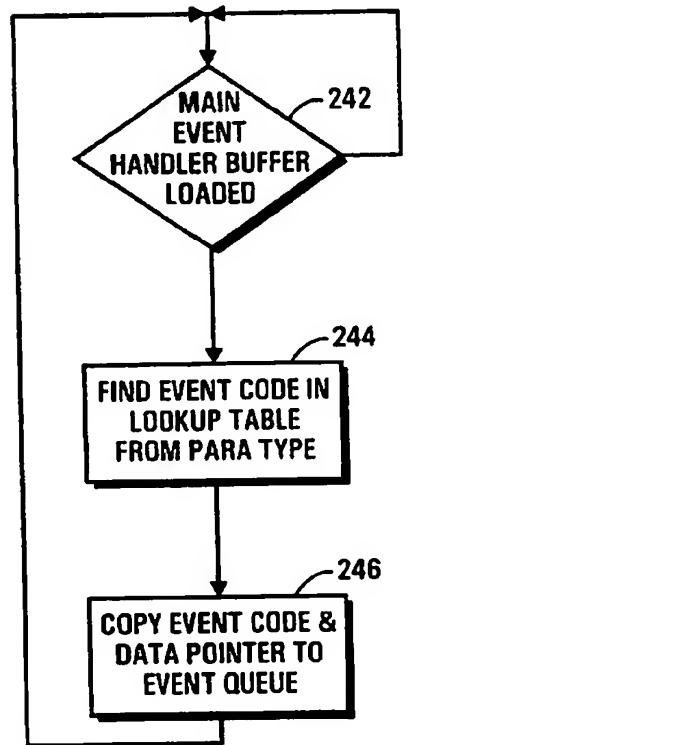


FIG. 10

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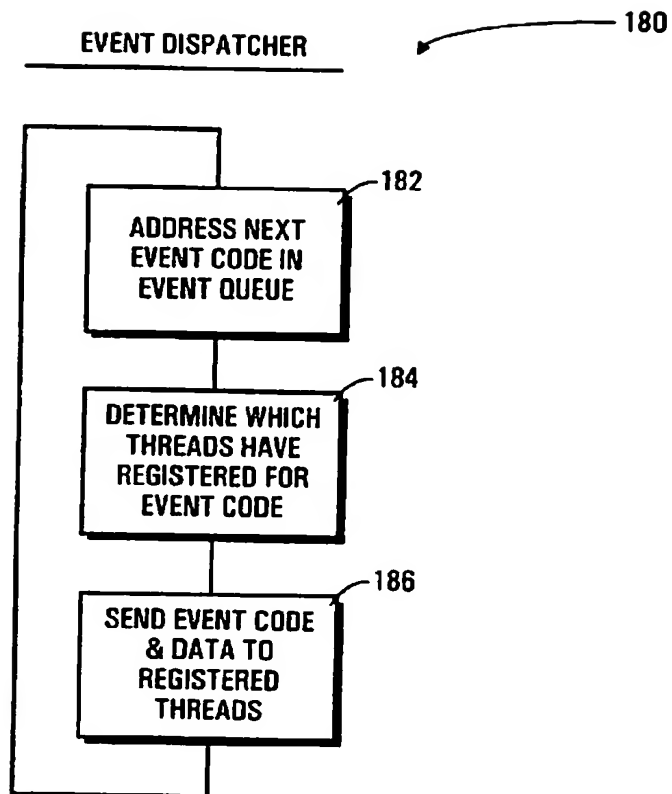


FIG. 11

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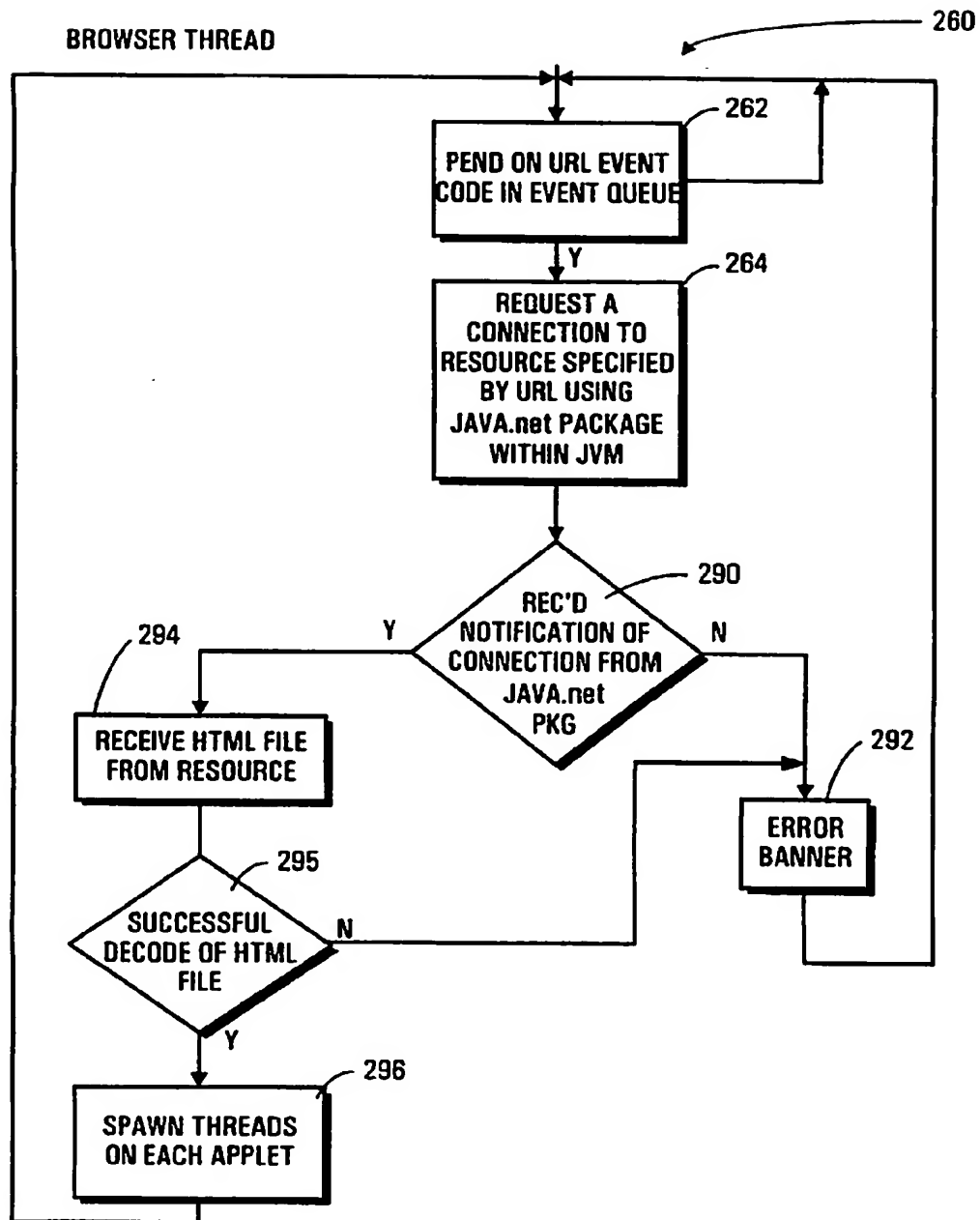


FIG. 12

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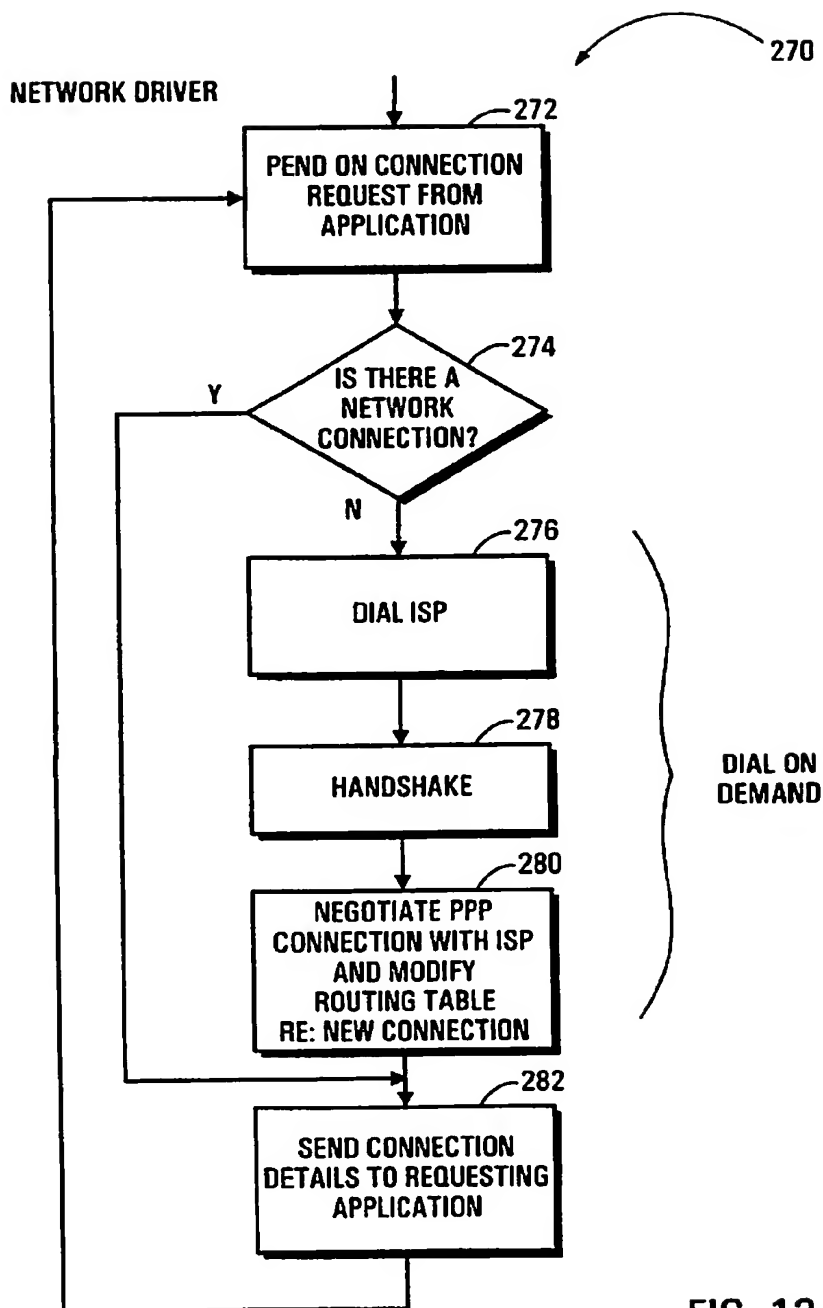


FIG. 13

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APPLET THREAD

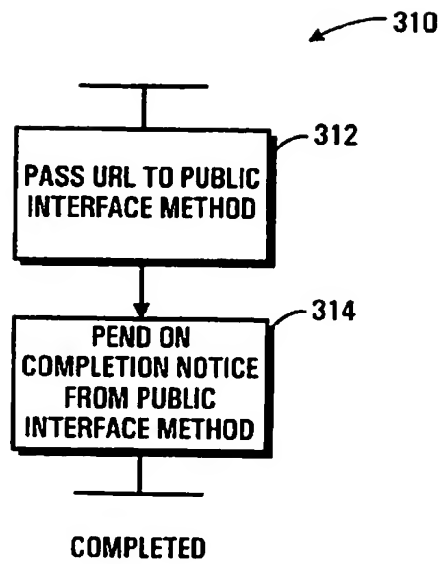


FIG. 14

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PUBLIC INTERFACE METHOD

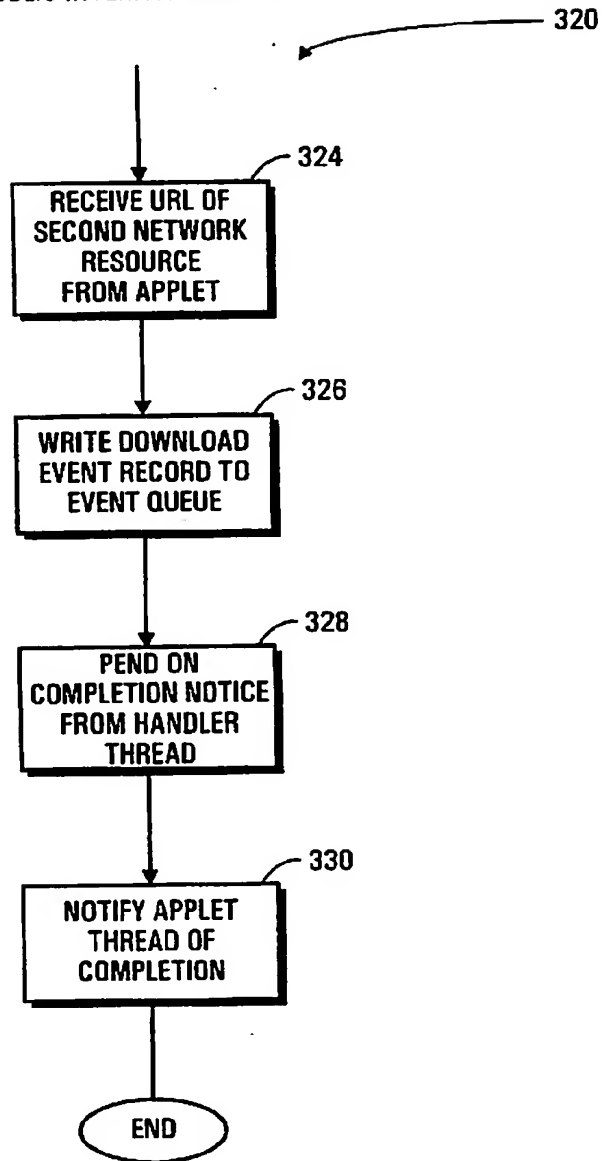


FIG. 15

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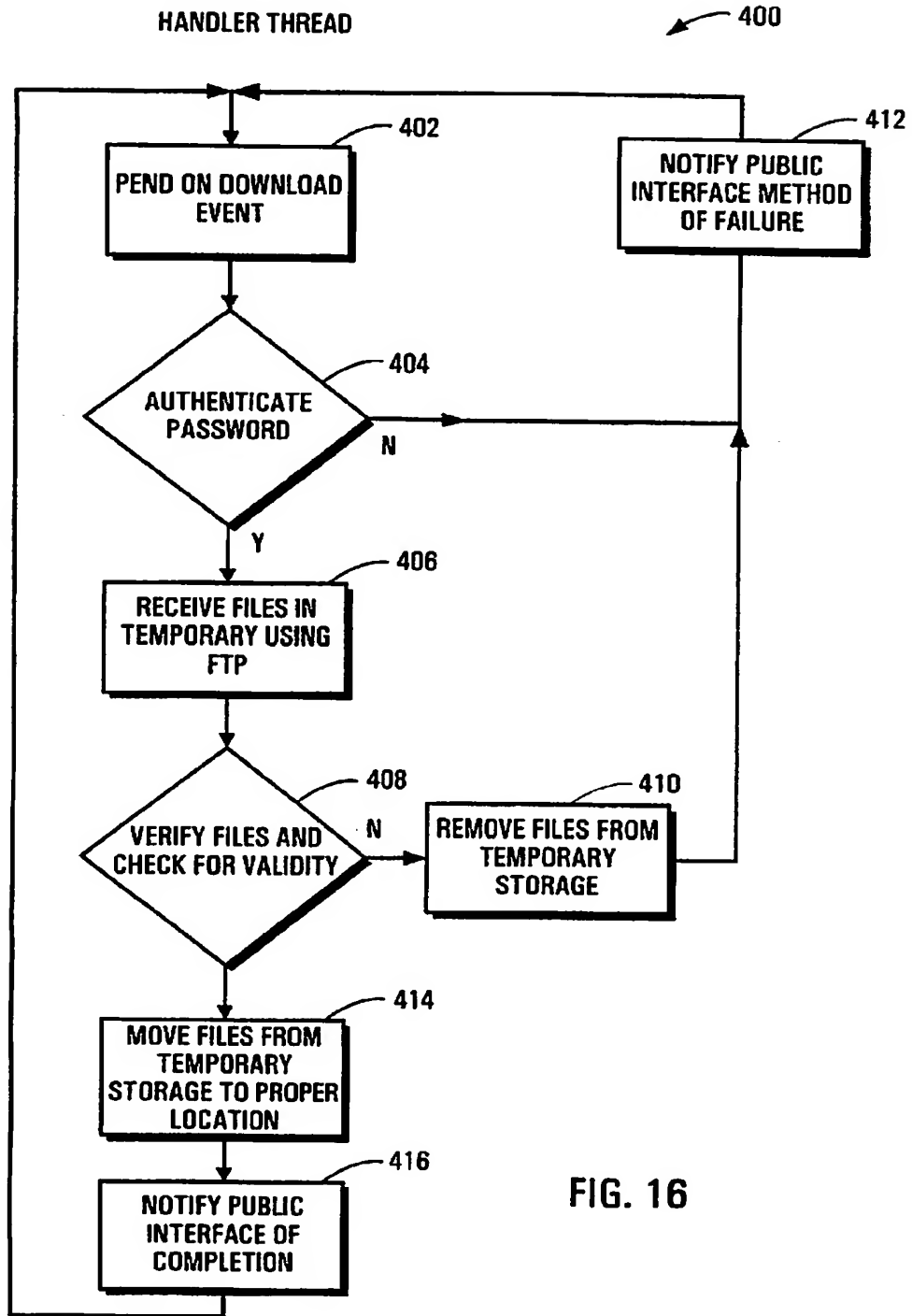


FIG. 16